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Oak Wilt Meeting, Bedford, Pennsylvania
December 1 and 2, 1960

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Aerial Survey Methods

I. Introduction

A. Past Work

1. Until this year the Beltsville laboratory has been mainly interested in the survey methods to detect and appraise insect outbreaks - both visually and photographically.
2. Most of our photo work has been concerned with large target photography, i. e., large masses of defoliation or large groups of trees.
3. Your oak wilt damage is more subtle, looks more like other kinds of mortality - normal decadence, tree girdling, etc. Also it occurs usually in single trees; this offers a relatively small target. As you are well aware, it requires an intensive type survey.
4. We did some early oak wilt detection in Arkansas, Missouri, Kentucky, and West Tennessee with Tom Jones, 1950 and 1951. There were roadside surveys and involved observing from 200 feet above the ground.

B. Will now discuss some of air survey methods used on insect visual surveys. I will go over these briefly for those of you who are not familiar with them.

II. The operation recorder survey. It is an empirical type survey similar to timber cruising on sample strips.

A. Procedure

1. Flight lines (like cruise lines) are predetermined.
2. Pilot flies along lines and marks his position in Morse code with an electrical key.
3. Air observer looks through a viewer; he seldom knows where he is but concentrates on the passing landscape. He holds the appropriate key down on his switchboard while the condition he is watching remains the same. He changes keys when the condition class changes.

4. Data is reconciled in office to make recorder chart
5. Final stage is to draw in type lines on final map or determine number of trees counted per unit distance of flight strip (10 miles usually).

B. There is considerable flexibility in this kind of survey.

1. Unproductive areas are avoided.
2. Flight line spacing can be easily increased or decreased depending upon intensity of survey desired. Concentrations of damage can be sampled more heavily.
3. It can be conducted cheaply and produces reliable results for a sampling survey when exact location of suspect tree is not needed.

C. Disadvantages for oak wilt surveys.

1. Ground checking would be difficult; a second reconnaissance flight would be needed to pinpoint suspects. However, such a survey would direct the reconnaissance to the concentrations of damage.
2. May be useful only in areas where no control work is anticipated and a rapid method with limited ground checking would suffice.

III. Sketch mapping in strips is essentially what most of you are currently doing. In the case of bark beetle damage we have flown strips up to 8 miles apart with the observers plotting within one-half predrawn lines. These strips are drawn on either side of flight line.

- A. Test of observer accuracy in mountains of North Carolina showed that plotting of single trees had greater inaccuracy. Becomes worse as distance from plane increases. As expected large areas of kill were picked up most frequently.
- B. Essentially this is what the Southeastern Station found when they ran 100 ground check for oak wilt air observers; they picked up only one-third of all trees found on ground.
- C. Again repetitive surveys of this kind on a sampling basis may permit yearly comparisons where no control measures are anticipated.
- D. It has the advantage that precise locations can be plotted without additional flying for ground checking.

IV. Equipment and devices which may permit more accurate detection and quicker training for oak wilt observers.

A. Distance measuring device for estimating distance from plane.

B. Magenta filter (10 M printing foil) in safety shield - exaggerates off color reds and browns. A 5-Cyan filter can be added to help neutralize the pink color. Wear found that AO rose smoke sunglasses were helpful.

C. Map rolling device for flat or rolling country is useful for plotter. Holds a long strip of map in a small space - this is helpful in small aircraft cabins.

V. Aerial photographic test in eastern Tennessee, June 1960.
Example of excellent cooperation between two research units and forest pest control in the Forest Service.

A. Air photography was tested against visual observation on a 100 sq. mile area in farm country near Greeneville, Tennessee.

B. Procedure

1. Visual survey was made in usual manner and within two days of air photography.
2. Two scales - 1:3960 and 1:7920 (5 chains & 10 chains to inch, respectively) and two films (Super Anscochrome and Camouflage Detection) were tested on two areas.
3. One area was considered as a training area and used in comparing the films. The second area compared the methods.
4. The results are shown in the following table:

Comparison of Air Survey Methods to Detect 21 Known Oak Wilt Trees
Telford, Tennessee - June 17-18, 1960

<u>Air Photography (1:3960)</u>		<u>Visual Observation</u>	
	Interpreter S	Interpreter B	
Correct	14	9	9
Omissions	7	12	12
Commissions	12	20 <u>1/</u>	0

1/ Eleven of these should be ground checked.

C. Discussion

1. On the basis of this test we would not recommend the use of air photography at this time.
2. Cost would be about 20 times visual observation and the results little better.
3. Note that interpreter 3 found 14 of 21 spots; this is exceptionally good and points out that experience in knowing what to look for pays off.
4. Of the films, the Super Anscochrome at 1:3960 scale proved best - more oak wilt spots were discovered and more confidence was felt in the interpretation of the film.
5. The method should be tried in heavily wooded areas where the pictures would be of more benefit in ground checking. It was found that a field man could walk directly to the suspect by using the marked color photo in the woods. This resulted in considerable saving of ground search.
6. If the cost of photography could be spread over other uses - such as management, timber sales, etc., the cost would not have to be entirely borne by oak wilt surveys.





